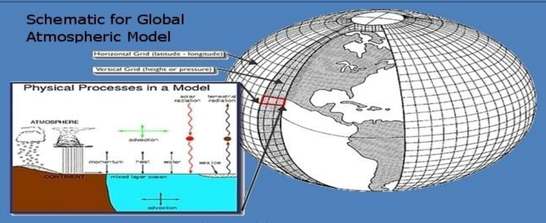
Understanding Global Climate Change

Abhishek Tripathi (SCI), Peer-Timo Bremer, Dean Williams, Charles Doutriaux(LLNL), Valerio Pascucci (SCI)

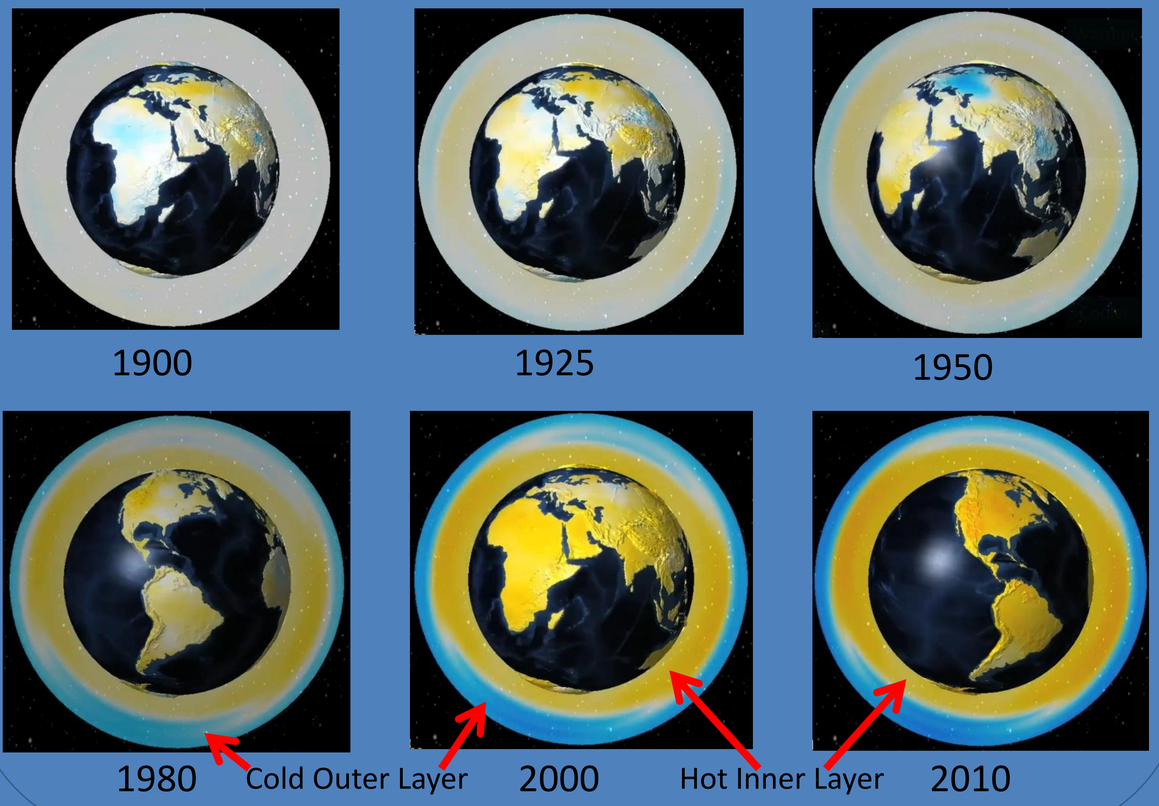
What is Climate Modeling ?

Use of quantitative methods to simulate the interactions of the atmosphere, oceans, land surface, and ice.

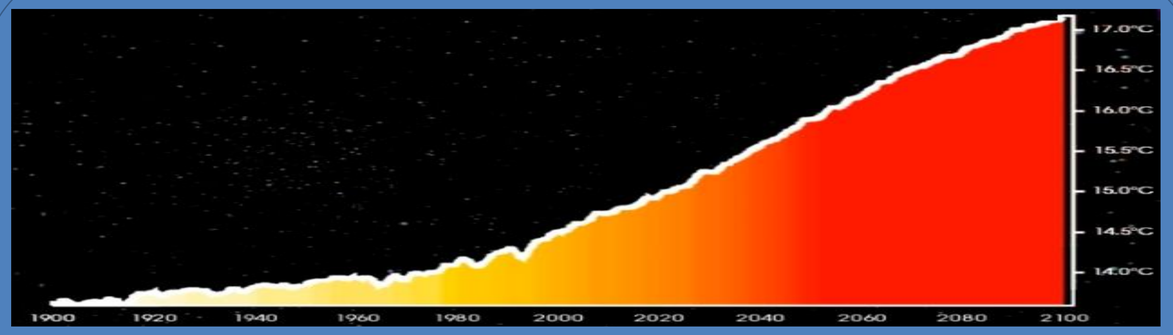


Climate models are systems of differential equations based on the basic laws of physics, fluid motion, and chemistry. To "run" a model, scientists divide the planet into a 3-dimensional grid, apply the basic equations, and evaluate the results. Atmospheric models calculate winds, heat transfer, radiation, relative humidity, and surface hydrology within each grid and evaluate interactions with neighboring points.

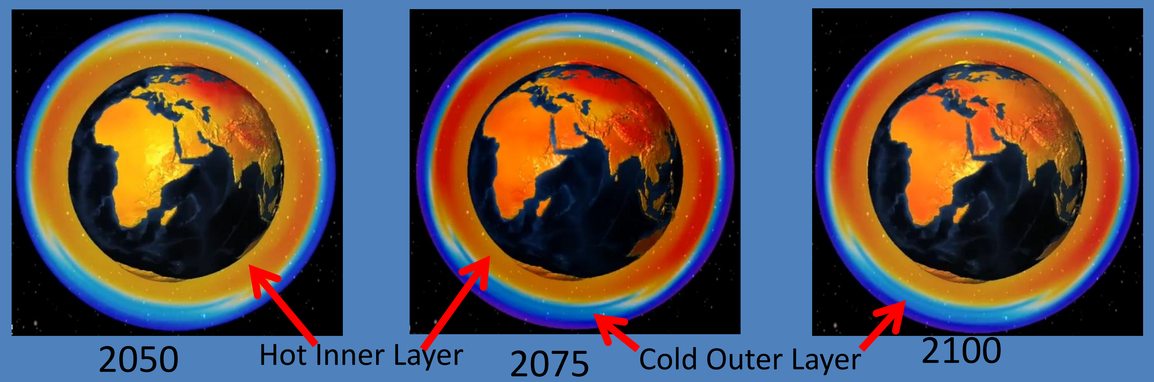
The story so far (1900 – 2010)



Average Global Temperatures indicate a warming trend but that alone does not explain why it is happening.



Projected temperature changes(2010 – 2100)



Simulation of historical and projected climate data shows a strong warming trend in the lower atmosphere underneath a cooling layer in the upper atmosphere. This structure is compatible with a preponderance of the effects of greenhouse gases compared to potential increase in solar activity.